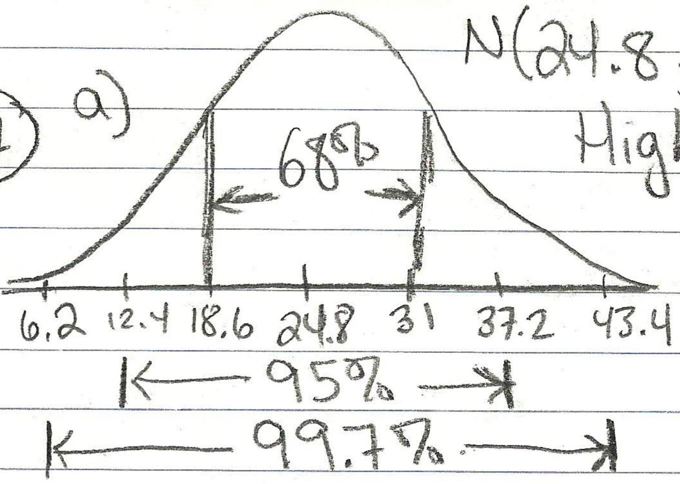
17) a)



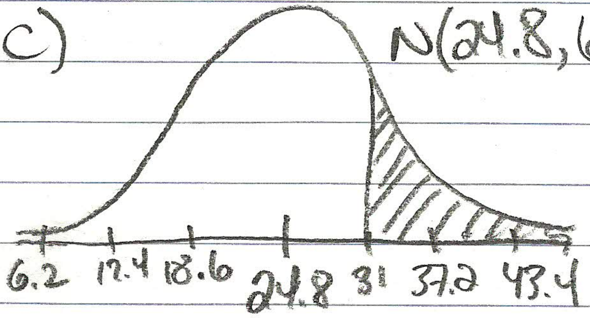
N(24.8, 6.2)

Highway milage (miles per gallon)

Note: 68% between $\pm 1\sigma$
95% between $\pm 2\sigma$
99.7% between $\pm 3\sigma$

b) See "a" – between 18.6 mpg and 31 mpg

c)

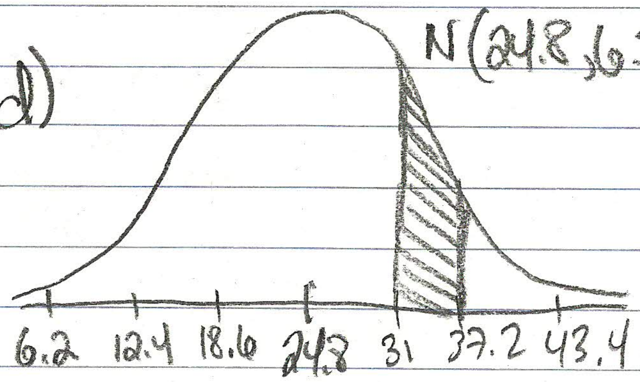


N(24.8, 6.2)

P-value $= p(y > 31)$
$= p(z > 1)$
$= 16\%$

from 68-95-99.7 Rule

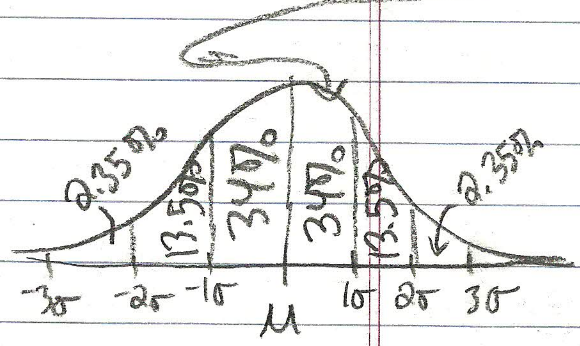
d)



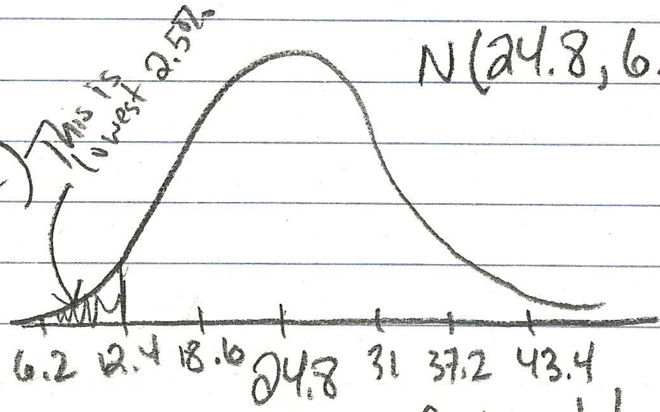
N(24.8, 6.2)

P-value $= p(31 < y < 37.2)$
$= p(1 < z < 2)$
$= 13.5\%$

THINK ABOUT LIKE



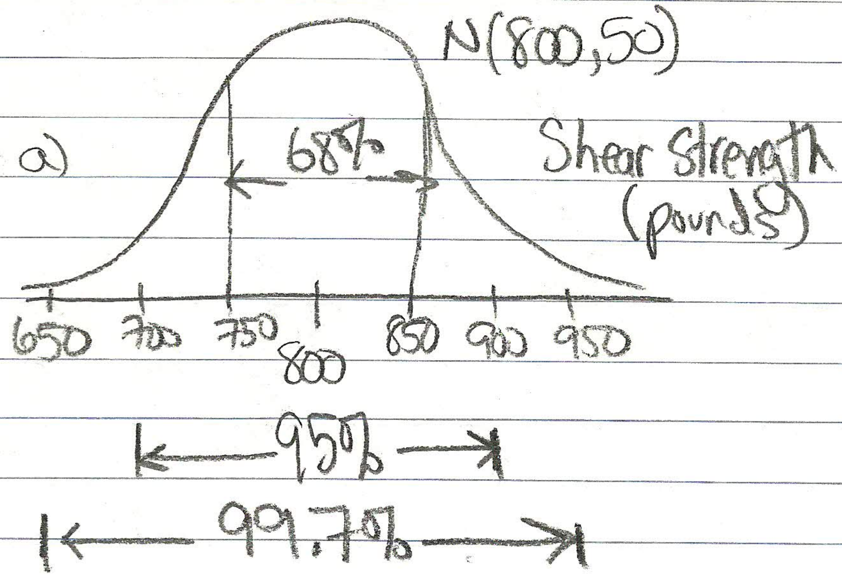
e)



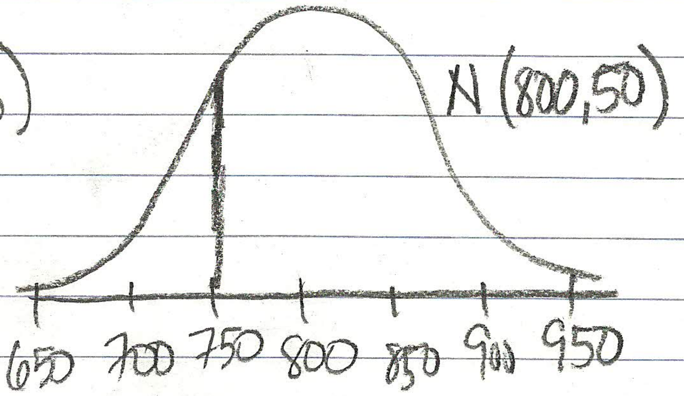
N(24.8, 6.2)

A score below 12.4 is the lowest 2.5%.

22 a)



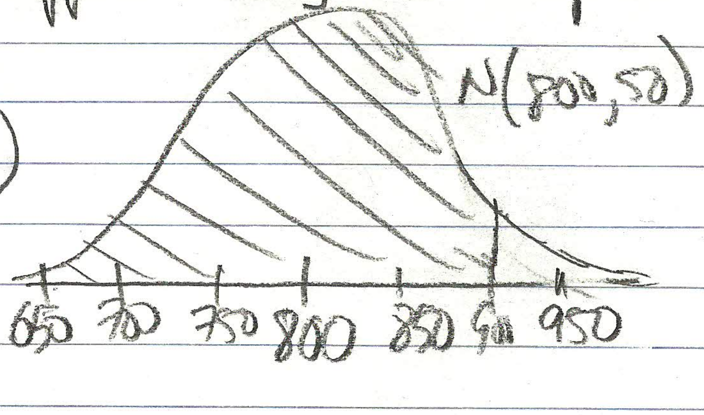
b)



A shear strength of 750 pounds has a z-score of -1, meaning it is 1 standard deviation below the mean. 16% of rivets have a shear strength less than 750.

If you are expecting your rivet to support 750 pounds, approximately 16% of the rivets would fail.

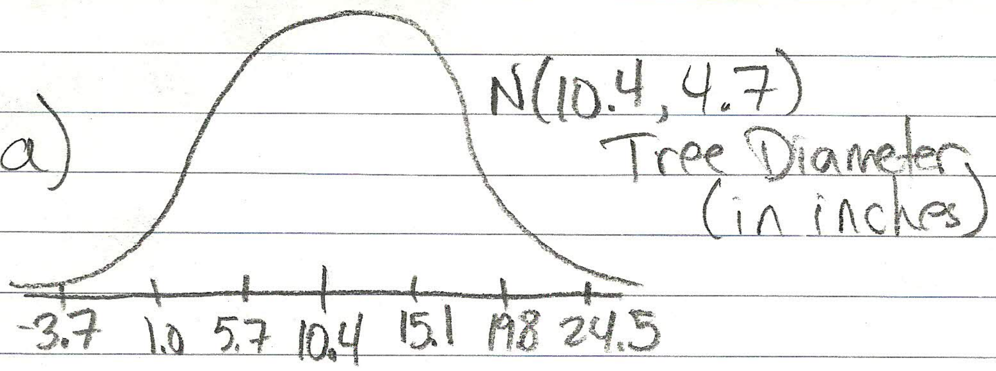
c)



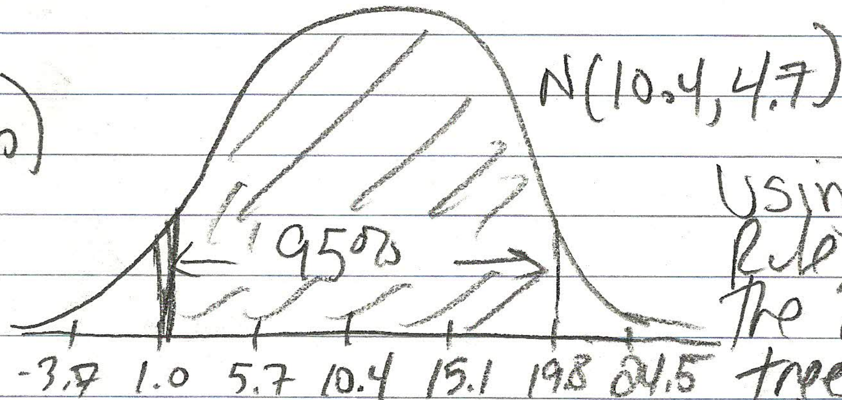
$$\begin{aligned} P\text{-value} &= P(y < 900) \\ &= P(z < 2) \\ &= 97.5\% \end{aligned}$$

d) Answers may vary. In order to minimize the chance of failure they should only be used in situations where the shear strength is several SD away from the mean. For example, if we used these rivets in situations where the shear strength used was 650 (3 SD below mean), the chance that the bolts failed would be .0015, or .15% of the time.

23) a)

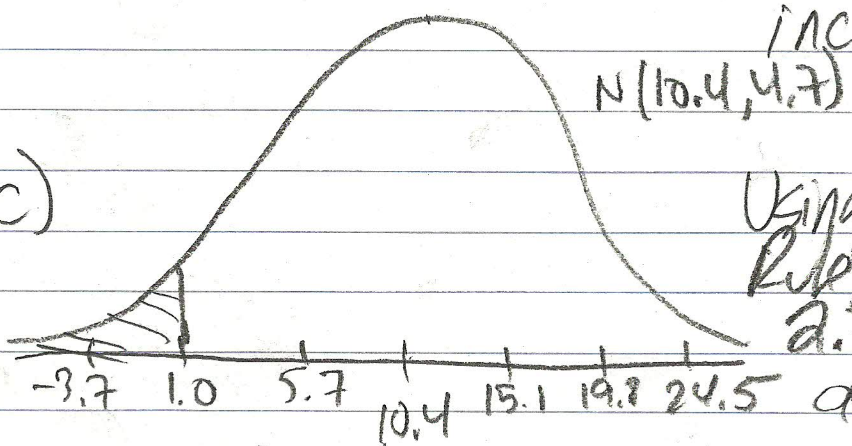


b)



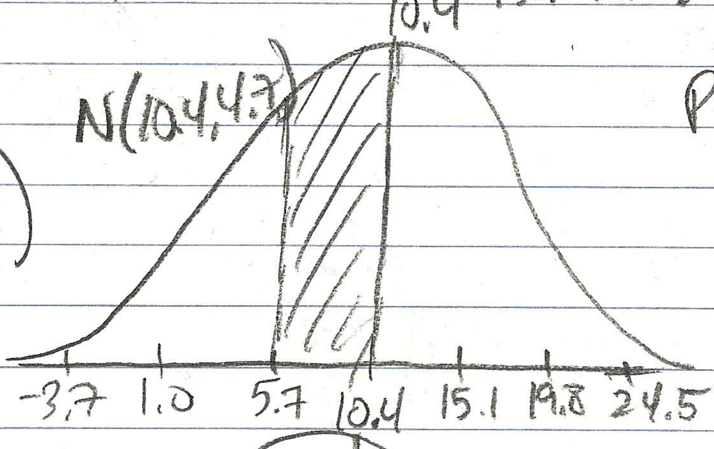
Using the 68-95-99.7 Rule, we would expect the middle 95% of tree diameters to be between 1 and 19.8 inches.

c)



Using the 68-95-99.7 Rule, we would expect 2.5% of tree diameters are less than 1 inch.

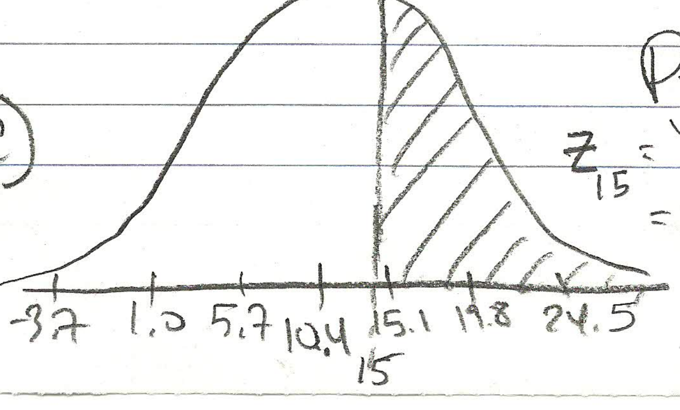
d)



$$\text{P-value} = p(5.7 < y < 10.4)$$
$$= p(-1 < z < 0)$$
$$= 34\%$$

(Could use Rule, see #17 e)

e)



$$z_{15} = \frac{y-\mu}{\sigma} = \frac{15-10.4}{4.7} = .98$$

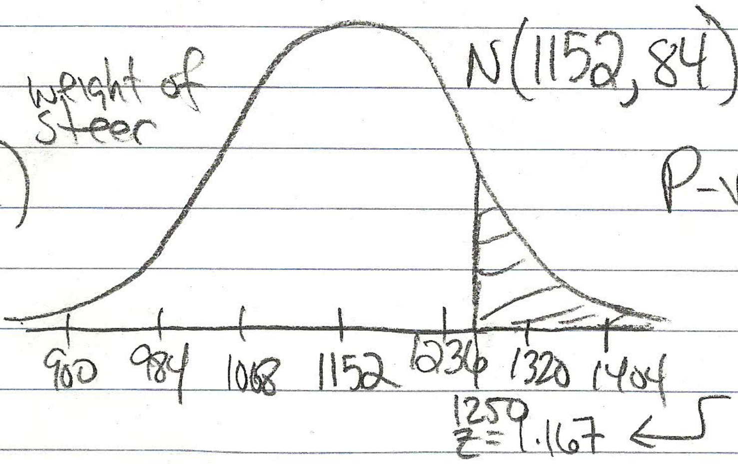
$$\text{P-value} = p(y > 15)$$
$$= p(z > .98)$$
$$= 16\%$$

27) a.) Roughly 16%

b) That would mean that 16% of college students watch less than −1.27 hours of TV per week. THIS MAKES NO SENSE!

c) It does not meet the Nearly Normal Condition. The data is skewed right.

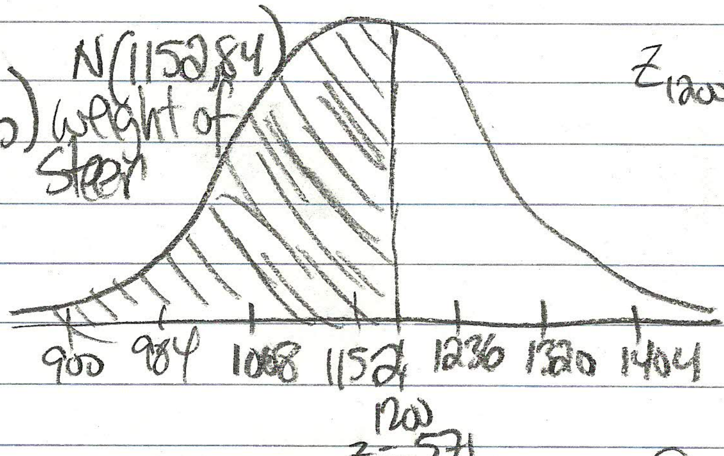
33) a)



P-value $= p(y > 1250)$
$= p(z > 1.167)$
$= 12.2\%$

$Z_{1250} = \frac{y-\mu}{\sigma} = \frac{1250-1152}{84} = 1.167$

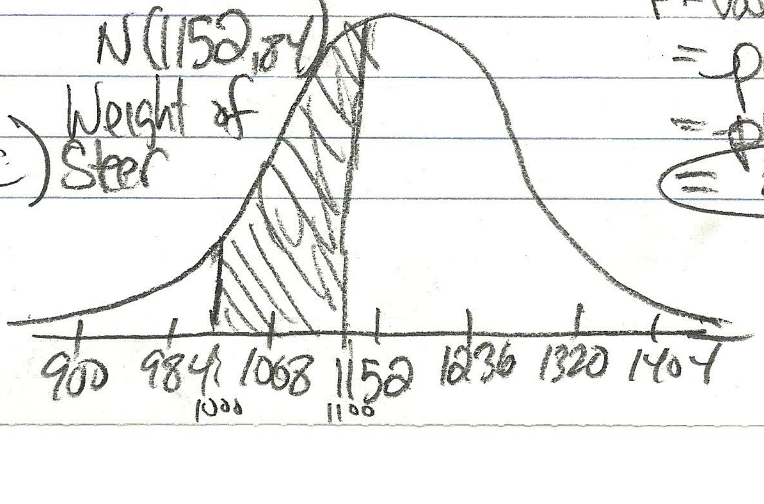
b)



$Z_{1200} = \frac{y-\mu}{\sigma}$
$= \frac{1200-1152}{84}$
$= .571$

P-value =
$= p(y < 1200)$
$= p(z < .571)$
$= 71.6\%$

c)

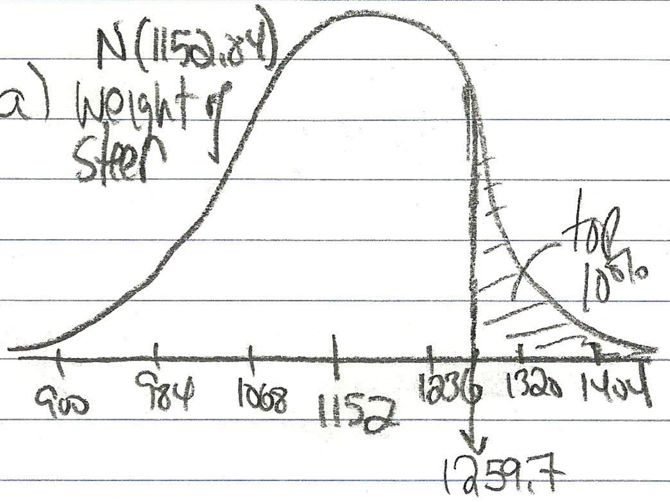


P-value
$= p(1000 < y < 1100)$
$= p(-1.81 < z < -.619)$
$= 23.3\%$

$Z_{1000} = \frac{y-\mu}{\sigma}$
$= \frac{1000-1152}{84}$
$= -1.81$

$Z_{1100} = \frac{y-\mu}{\sigma}$
$= \frac{1100-1152}{84}$
$= -.619$

35) a) Weight of Steer



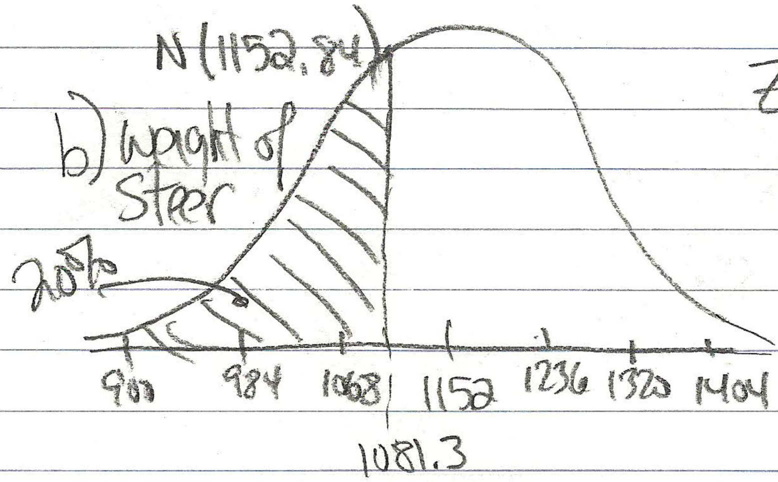
$Z_{\text{score for highest 10\%}} = 1.28$ ← invNorm(.9)

$Z = \frac{Y-\mu}{\sigma}$

$1.28 = \frac{Y-1152}{84}$

$Y = 1259.7$ lbs

b) Weight of Steer



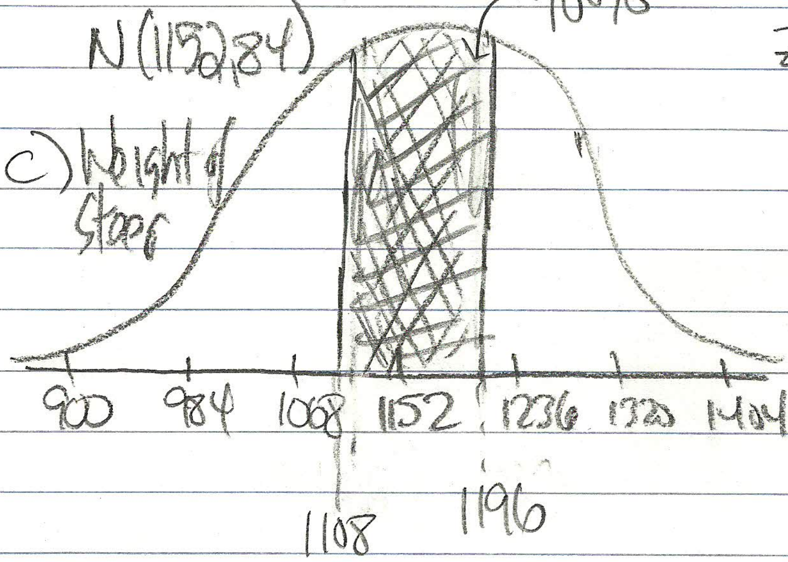
$Z_{\text{for lowest 20\%}} = -.84$ ← invNorm(.2)

$Z = \frac{Y-\mu}{\sigma}$

$-.84 = \frac{Y-1152}{84}$

$Y = 1081.3$ lbs

c) Weight of Steer



$Z_{\text{for lower limit of 40\%}} = -.524$

$Z = \frac{Y-\mu}{\sigma}$

$-.524 = \frac{Y-1152}{84}$

$Y = 1108$

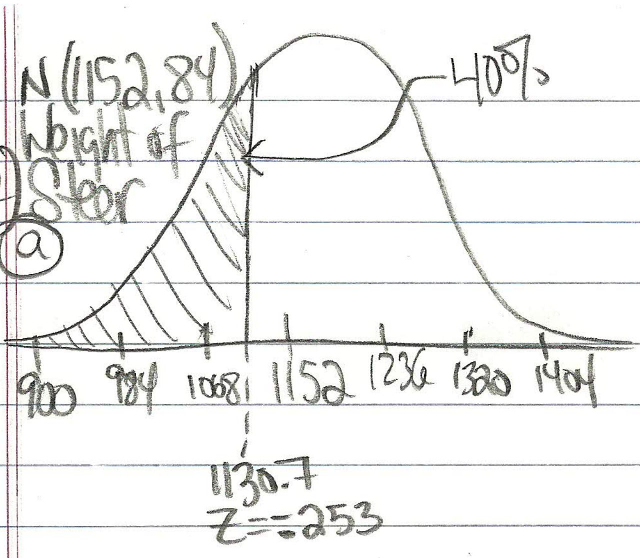
$Z_{\text{for upper limit of 40\%}} = .524$

$Z = \frac{Y-\mu}{\sigma}$

$.524 = \frac{Y-1152}{84}$

$Y = 1196$

37) (a)



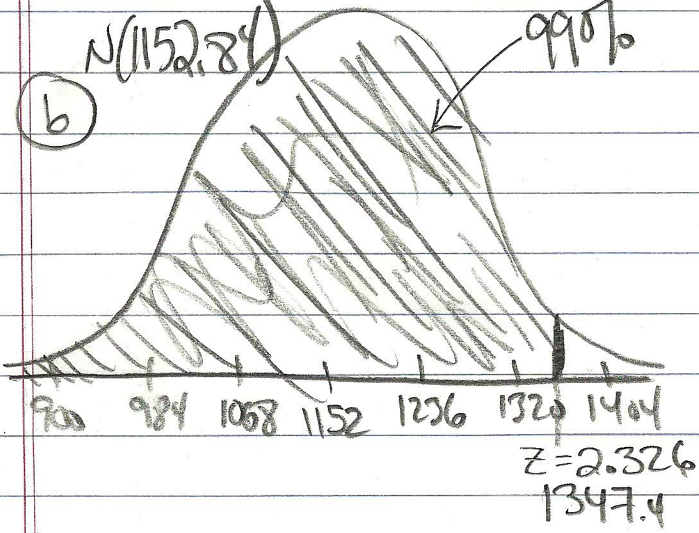
$Z_{40\text{th percentile}} = -.253$

$z = \frac{y-\mu}{\sigma}$

$-.253 = \frac{y-1152}{84}$

$\boxed{y = 1130.7 \text{ lbs}}$

(b)



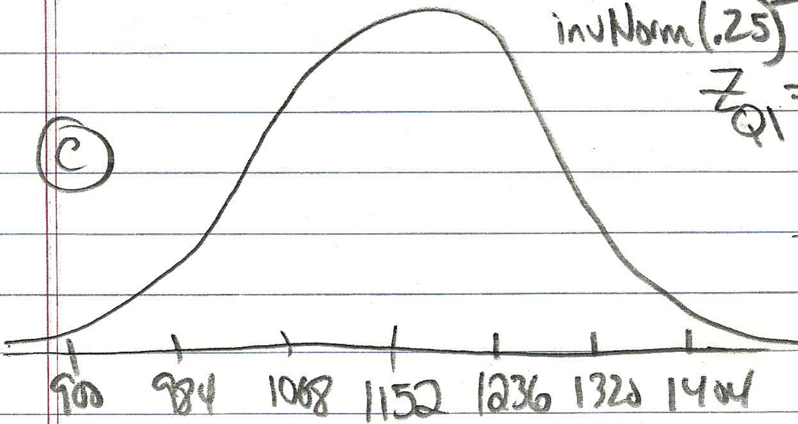
$Z_{99\text{th percentile}} = 2.326$

$z = \frac{y-\mu}{\sigma}$

$2.326 = \frac{y-1152}{84}$

$y = 1347.4 \text{ lbs}$

(c)



invNorm(.25)

$Z_{Q1} = -.674$ $\quad Z_{Q3} = .674$

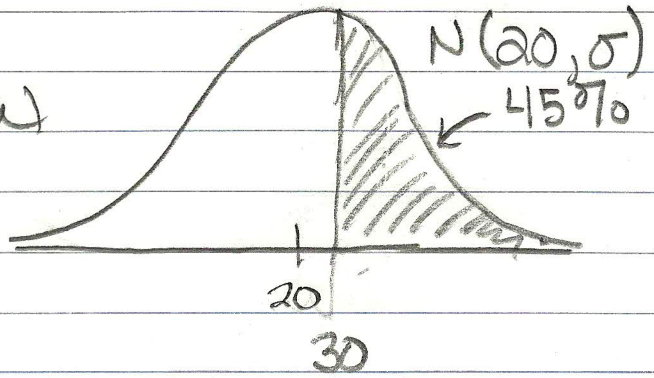
$z = \frac{y-\mu}{\sigma}$ $\quad z = \frac{y-\mu}{\sigma}$

$-.674 = \frac{y-1152}{84}$ $\quad .674 = \frac{y-1152}{84}$

$y = 89.21$ $\quad y = 110.79$

$Q_1 = 89.21$

39) a)



$Z_{45\%} = .126 \leftarrow \text{invNorm}(.55)$

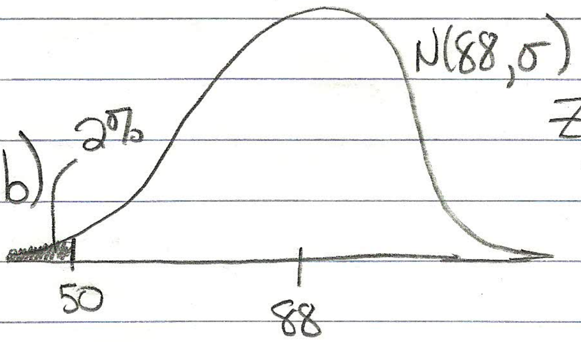
$Z = \frac{Y-\mu}{\sigma}$

$.126 = \frac{30-20}{\sigma}$

$.126 = \frac{10}{\sigma} \Rightarrow .126\sigma = 10$

$\sigma = 79.58$

b)



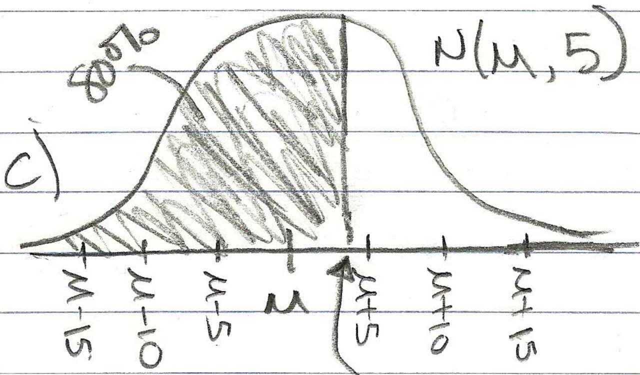
$Z_{2\%} = -2.054$

$Z = \frac{Y-\mu}{\sigma}$

$-2.054 = \frac{50-88}{\sigma}$

$\sigma = 18.50$

c)

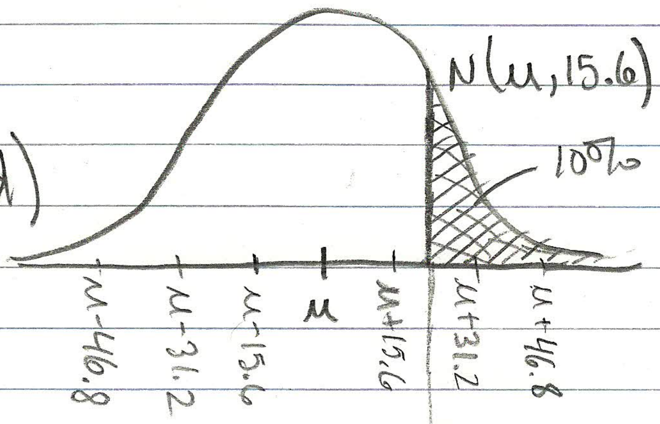


$Z_{80\%} = .842 \leftarrow \text{invNorm}(.8)$

$Z = \frac{Y-\mu}{\sigma} \Rightarrow .842 = \frac{100-\mu}{5}$

$\mu = 95.79$

d)

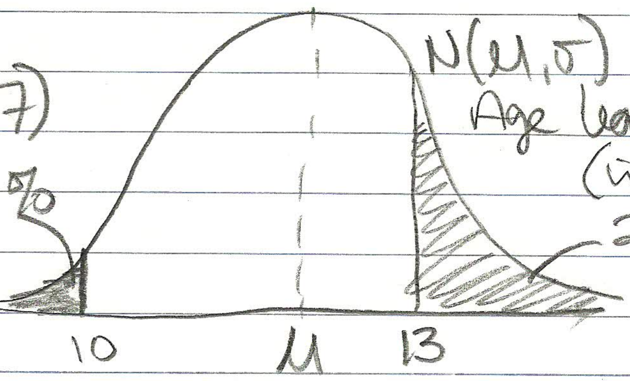


$Z_{10\%} = 1.282 \leftarrow \text{invNorm}(.9)$

$Z = \frac{Y-\mu}{\sigma} \Rightarrow 1.282 = \frac{17.2-\mu}{15.6}$

$\mu = -2.79$

47)



$Z_{5\%} = -1.645$ (invNorm(.05)) $Z_{75\%} = .674$ (invNorm(.75))

$$Z = \frac{Y-\mu}{\sigma}$$

$$-1.645 = \frac{10-\mu}{\sigma}$$

$$.674 = \frac{13-\mu}{\sigma}$$

System of equations with 2 variables

⇓

$$-1.645\sigma = 10-\mu$$
$$.674\sigma = 13-\mu$$

$$-1.645\sigma = 10-\mu$$
$$-.674\sigma = -13+\mu$$
$$-2.319\sigma = -3$$

$$\sigma = 1.294$$

Solving for σ, using elimination

⇓

$$-1.645 = \frac{10-\mu}{1.294}$$

Solving for μ, using substitution

$$\mu = 12.13$$